

Characters association and path analysis in winged bean (*Psophocarpus tetragonalobus* L.)

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SUMMARY

An experiment comprising twenty one genotypes of winged bean was conducted to collect the information on various genetic parameters for improving grain yield through direct and indirect selection. Grain yield per plant showed positive and significant correlation coefficient with 100 seed weight, grains per pod, dry pod weight, and number of pod per plant and pod width at both genotypic and phenotypic level. The result indicated significant and positive association of the quantitative traits with grain yield. Selection for grain yield improvement based on pod length, pod width, number of grain per pod, number of pod per plant, dry fruit weight and 100 seed weight has been suggested.

Key words : Winged bean, Correlation, Path analysis

Correlation coefficient analysis measures the mutual relationship between two plant characters and determines component characters in which selection can be based for genetic improvement in yield. Whether the association of these characters due to their direct effect on yield or is a consequence of their indirect effects via other component characters may be answered through path coefficient analysis. The present study was, therefore, undertaken to find out the relative importance of degree of association of different yield contributing traits and direct and indirect effects on yield.

MATERIALS AND METHODS

Twenty one genotypes (IC-15018, IC-17005, IC-26949, IC-26949-1, IC-31981, IC-34865-1, IC-95222, IC-95224, IC-95225, IC-95227, IC-95228, IC-95229, IC-95231, IC-95233, IC-95237, IC-95240, IC-95241, TMV Local, EC-27886, EC-1426544 and EC-142662) of winged bean were obtained from National Bureau of Plant Genetic Resources, Akola (Maharashtra) maintained at Vegetable Research Farm., Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during the summer season 2006-07. The experiment was sown in a randomized block design with three replication. Each genotype was sown in one row plot. Each plot consisted

of one row of 5 m length with row to row and plant to plant distance being 75 and 25 cm, respectively. Recommended agronomic practices were followed to raise the healthy crop. Observation on nine characters *i.e.* days to 50% flowering, days to maturity, pod length, pod width, number of grain per pod, number of dry pod per plant, dry pod yield per plant, 100 seed weight and seed yield per plant were taken on three competitive plant from each replication of genotype under study. Mean values were subjected to analysis of variance, genotypic and phenotypic correlation coefficient and path coefficient was computed by using the formula of Dewey and Lu (1959).

RESULTS AND DISCUSSION

The analysis of variance displayed highly significant differences among the genotypes for all the characters. For almost all the characters value for genotypic correlation coefficient were found to be higher than their corresponding phenotypic correlation coefficient values. The phenotypic correlation coefficient between grain yields per plant showed significant and positive correlation with pod width, number of grain per pod, number of pod per plant, dry pod weight and 100 seed weight (Table 1). 100 seed weight expressed significant and positive correlation with pod width, number of pod per plant and dry pod weight. Pod width was positively correlated with days to maturity while, pod width showed significant and positive correlation with pod length. Dry pod weight was positively correlated with pod width and number of grains per pod. The fluctuation in association between different characters may be attributed to varied impact of environment factors on of the associates.

Partitioning of genotypic correlation into direct and indirect effects revealed that maximum direct effect for

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Table 1: Estimates of phenotypic and genotypic correlation coefficients among yield and yield traits in winged bean

Characters		Days to maturity	Pod length	Pod width	Number of grains/pod	Number of pods/Plant	Dry pod weight	100 seed weight	Grain yield/plant
Days to 50% flowering	p	0.172	-0.223	-0.169	-0.007	-0.207	-0.149	-0.159	-0.018
	g	0.193	-0.221	0.235	-0.024	-0.220	-0.139	-0.164	-0.019
Days to maturity	p		0.253*	0.156	-0.004	0.123	0.109	-0.065	-0.063
	g		0.272*	0.203	0.232	0.136	0.111	-0.067	-0.068
Pod length	p			0.426**	0.254	0.396**	0.099	0.062	-0.036
	g			0.596**	0.281	0.430**	0.109	0.068	-0.038
Pod width	p				0.187*	-0.060	0.171*	0.430**	0.180*
	g				0.208*	0.009	0.214*	0.711**	0.285*
Number of grains per pod	p					0.066	0.202*	-0.088	0.280
	g					-0.045	0.220*	-0.094	0.306*
Number of pods per plant	p						-0.104	0.142*	0.251*
	g						-0.110	0.183*	0.272*
Dry pod weight	p							0.343**	0.234*
	g							0.368**	0.245*
100 seed weight	p								0.883*
	g								0.899*

* and ** indicate significant of values at P=0.05 and 0.01, respectively

Table 2 : Phenotypic direct and indirect effects of different traits in winged bean

Characters		Days to 50% flowering	Days to maturity	Pod length	Pod width	Number of grains/pod	Number of pods / plant	Dry pod weight	100 seed weight	Correlated value with yield
Days to 50% flowering	p	0.020	-0.001	-0.001	-0.008	-0.002	-0.020	0.001	-0.105	-0.018
Days to maturity	p	-0.002	0.050	0.010	-0.028	-0.017	-0.029	-0.096	0.059	-0.063
Pod length	p	-0.089	0.013	0.049	-0.021	0.012	-0.036	-0.020	0.056	-0.036
Pod width	p	-0.010	-0.008	0.021	0.050	0.027	0.049	0.026	0.033	0.188
Number of grains per pod	p	-0.015	-0.017	0.010	-0.016	0.438	-0.019	-0.030	-0.071	0.280
Number of pods per plant	p	-0.047	-0.046	0.019	-0.059	0.080	0.243	0.001	0.079	0.251
Dry pod weight	p	-0.060	-0.085	0.065	-0.056	-0.086	0.006	0.364	0.151	0.234
100 seed weight	p	-0.021	-0.003	0.003	-0.082	-0.069	0.021	0.142	0.910	0.883

Residual effect=0.1459

grain yield was observed by 100 seed weight followed by number of grains per pod, dry pod weight and number of pods per plant (Table 2). Positive effect with low value *via* pod weight, days to maturity, pod length and pod width were also contributed as positive response to grain yield. Days to 50% flowering is the last character shows positive direct effect with low value on grain yield but its direct effect was negated due to indirect effect *via* remaining

attributes. As per result a large number of traits contributed to total grain yield *via* several yield related traits. This show that crop yield can be improved through improving the yield itself. Similar observations were made by Singh *et al.*, 1995. It is concluded that the above characters might be considered while making selection for higher grain yield in winged bean.

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